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संपीडक, वायुदाब चालित औज़ार और मशीनें — शब्दावली

भाग 1 सामान्य

Indian Standard

COMPRESSORS, PNEUMATIC TOOLS AND MACHINES — VOCABULARY

PART 1 GENERAL

ICS 01.040.23; 01.040.25; 23.140; 25.140.10

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Price Group 3

Compressors, Blowers and Exhausters Sectional Committee, MED 22

NATIONAL FOREWORD

This Indian Standard (Part 1) which is identical with ISO 3857/I-1977 'Compressors, pneumatic tools and machines — Vocabulary — Part I : General' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Compressors, Blowers and Exhausters Sectional Committee and approval of the Mechanical Engineering Division Council.

The text of the ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain terminology and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker in the International Standard while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 31-1 : 1992 Quantities and units — Part 1: Space and time (*third revision*)	IS 1890 (Part 1) : 1995 Quantities and units: Part 1 Space and time (*third revision*)	Identical
ISO 31-2 : 1992 Quantities and units — Part 2: Periodic and related phenomena	IS 1890 (Part 2) : 1995 Quantities and units: Part 2 Periodic and related phenomena (*second revision*)	do
ISO 31-3 : 1992 Quantities and units — Part 3: Mechanics	IS 1890 (Part 3) : 1995 Quantities and units: Part 3 Mechanics (*second revision*)	do
ISO 31-4 : 1992 Quantities and Units — Part 4: Heat	IS 1890 (Part 4) : 2001 Quantities and units: Part 4 Heat (*second revision*)	do
ISO 31-8 : 1992 Quantities and units — Part 8: Physical chemistry and molecular physics	IS 1890 (Part 8) : 1995 Quantities and units: Part 8 Physical chemistry and molecular physics (*first revision*)	do

Indian Standard

COMPRESSORS, PNEUMATIC TOOLS AND MACHINES — VOCABULARY

PART 1 GENERAL

SCOPE AND FIELD OF APPLICATION

This International Standard constitutes the first part of a vocabulary relating to compressors, pneumatic tools and machines. It deals with basic concepts, symbols and units. Part II deals with compressors. Part III[1] deals with pneumatic tools and machines.

1 PRESSURES

1.1 atmospheric pressure : The absolute pressure of the atmosphere as measured at the place under consideration.

1.2 gauge pressure : The pressure as measured with reference to atmospheric pressure.

1.3 absolute pressure : The pressure with reference to absolute zero, i.e. with reference to an absolute vacuum. It equals the algebraic sum of atmospheric pressure and gauge pressure (static pressure or total pressure).

1.4 static pressure . The pressure as measured in a fluid in such conditions that no effect on measurement is produced by the fluid velocity.

1.5 dynamic pressure : That increase of pressure which would result if the energy of the flow velocity in gas or air flowing at uniform velocity were converted to pressure completely and without any losses, i.e. isentropically.

The pressure is equal to the product $\rho c^2/2$, where ρ is the fluid density and c is the flow velocity.

1.6 total pressure : The sum of the static and dynamic pressures.

It designates the fluid condition at which the flow energy of the fluid is converted into pressure without any losses. In a stationary body of fluid, the static pressure and total pressure are numerically equal.

OBJET ET DOMAINE D'APPLICATION

La présente Norme internationale constitue la première partie d'un vocabulaire relatif aux compresseurs, outils et machines pneumatiques. Elle traite des notions fondamentales, des symboles et unités. La partie II traite des compresseurs tandis que la partie III[1] traite des outils et machines pneumatiques.

1 PRESSIONS

1.1 pression atmosphérique : Pression absolue de l'atmosphère mesurée sur le lieu considéré.

1.2 pression effective (pression manométrique) : Pression mesurée par rapport à la pression atmosphérique

1.3 pression absolue : Pression par rapport au zéro absolu, c'est-à-dire par rapport au vide absolu. Elle est égale à la somme algébrique de la pression atmosphérique et de la pression effective (pression statique ou pression totale)

1.4 pression statique : Pression mesurée dans un fluide, dans des conditions telles que la vitesse de celui-ci n'ait aucune influence sur la mesure.

1.5 pression dynamique : Augmentation de la pression qui résulterait de la transformation intégrale, c'est-à-dire isentropique, de l'énergie cinétique du fluide s'écoulant à une vitesse uniforme, en énergie de pression.

Pression égale au produit $\rho c^2/2$ dans lequel ρ est la masse volumique du fluide et c la vitesse de l'écoulement.

1.6 pression totale : Somme de la pression statique et de la pression dynamique.

Elle caractérise l'état du fluide lorsque son énergie d'écoulement est transformée intégralement en pression. Dans un élément stationnaire du fluide, la pression statique et la pression totale sont numériquement égales.

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[1] In preparation.

[1] En préparation.

1.7 critical pressure : The limiting pressure above which no discontinuity is observed between the gas phase and the liquid phase, whatever the temperature.

1.8 reduced pressure : The quotient of the absolute pressure and the absolute critical pressure.

1.9 compressibility factor Z : A dimensionless factor designating the actual gas state from its perfect state.

It is expressed by the formula :

$$Z = \frac{pV_\mathrm{m}}{RT}$$

where

p is the pressure;

V_m is the molar volume;

R is the molar gas constant;

T is the thermodynamic temperature.

2 TEMPERATURES

2.1 static temperature : The temperature as measured in a fluid in such conditions that no effect on measurement is produced by the fluid velocity.

2.2 dynamic temperature : That increase of temperature which would result if the energy of the fluid velocity in gas or air at uniform velocity were converted to calorific energy completely and without any losses, i.e. isentropically.

2.3 total temperature : The sum of the static and dynamic temperatures. It designates the fluid condition at which the flow energy of the fluid is converted into calorific energy without any losses. In a stationary body of fluid, the static temperature and total temperature are numerically equal.

2.4 critical temperature : The limiting temperature above which no discontinuity is observed between the gas phase and the liquid phase, whatever the pressure.

2.5 reduced temperature : The ratio of the thermodynamic temperature of the fluid to its critical thermodynamic temperature.

1.7 pression critique : Pression limite au-dessus de laquelle on n'observe pas de discontinuité entre phase gazeuse et phase liquide, quelle que soit la température.

1.8 pression réduite : Rapport de la pression absolue à la pression critique absolue.

1.9 facteur de compressibilité Z : Facteur sans dimension caractérisant l'état réel du gaz par rapport à son état parfait.

Il s'exprime par la formule

$$Z = \frac{pV_\mathrm{m}}{RT}$$

où

p est la pression;

V_m est le volume molaire;

R est la constante molaire du gaz;

T est la température thermodynamique.

2 TEMPÉRATURES

2.1 température statique : Température mesurée dans un fluide, dans des conditions telles que la vitesse de celui-ci n'ait aucune influence sur la mesure.

2.2 température dynamique : Augmentation de la température qui résulterait de la transformation intégrale, c'est-à-dire isentropique, de l'énergie cinétique du fluide s'écoulant à une vitesse uniforme, en énergie calorifique.

2.3 température totale : Somme de la température statique et de la température dynamique. Elle caractérise l'état du fluide lorsque son énergie d'écoulement est transformée intégralement en énergie calorifique. Dans un élément stationnaire du fluide, la température statique et la température totale sont numériquement égales.

2.4 température critique : Température limite au-dessus de laquelle on n'observe pas de discontinuité entre phase gazeuse et phase liquide, quelle que soit la pression.

2.5 température réduite : Rapport de la température thermodynamique du fluide à sa température critique thermodynamique.

TABLE 1 – **Symbols and units**

TABLEAU 1 – **Symboles et unités**

Reference number in ISO/R 31[1] **N° de référence dans l'ISO/R 31**[1]	**Reference number in ISO 3857**[2] **N° de référence dans l'ISO 3857**[2]	**Quantity**	**Grandeur**	**Symbol** **Symbole**	**Dimensions**[3]	**SI unit** **Unité SI**	**Other practical units** **Autres unités pratiques**
1-4.1		area	aire	A	L^2	m^2	mm^2
1-5.1		volume	volume	V	L^3	m^3	l, ml, mm^3
3-4.1		mass specific volume	volume massique	v	$M^{-1}L^3$	m^3/kg	
8-6.1		molar volume	volume molaire	V_m	L^3N^{-1}	m^3/mol	
1-6.1		time	temps	t	T	s	h, min, ms
1-10.1		velocity	vitesse	c	LT^{-1}	m/s	km/h
1-10.1		peripheral velocity	vitesse périphérique	u	LT^{-1}	m/s	
1-8.1		angular velocity	vitesse angulaire	ω	T^{-1}	rad/s	
2-3.2		rotational frequency	fréquence de rotation	n	T^{-1}	s^{-1}	min^{-1}
3-1.1		mass	masse	m	M	kg	t, g, mg
3-2.1		mass density	masse volumique	ρ	ML^{-3}	kg/m^3	kg/l
4-2.1		Celsius temperature	température usuelle	θ	Θ	°C	
4-1.1		thermodynamic temperature	température thermodynamique	T	Θ	K	
3-11.1		pressure	pression	p	$ML^{-1}T^{-2}$	Pa	MPa, bar, kPa, mbar
3-22.1		work	travail	W	ML^2T^{-2}	J	MJ, kJ, kW·h
3-23.1		power	puissance	P	ML^2T^{-3}	W	MW, kW
	II-6	mass specific energy	énergie massique	W_m	L^2T^{-2}	J/kg	kJ/kg
	II-6	volume specific energy	énergie volumique	W_v	$ML^{-1}T^{-2}$	J/m^3	J/l, kW h/m^3
	–	mass rate of flow	débit-masse	q_m	MT^{-1}	kg/s	kg/h
	II-3	volume rate of flow	débit-volume	q_v	L^3T^{-1}	m^3/s	m^3/h, m^3/min, l/s, ml/s
	II-1.4	relative clearance volume	espace mort relatif	e		pure number nombre pur	
	II-5.2	exponent for polytropic process in *p*.*V* diagram	exposant polytropique dans le diagramme *p*. *V*	n		pure number nombre pur	
8-33.1		molar gas constant	constante molaire du gaz	R	$ML^2T^{-2}\Theta^{-1}N^{-1}$	J/(K·mol)	kJ/(K·mol)
	I-1.9	compressibility factor	facteur de compressibilité	Z		pure number nombre pur	
	II-7	efficiency	rendement	η		pure number nombre pur	
12-6	II-1.10	tip Mach number	nombre de Mach de rotation	Ma_U		pure number nombre pur	
	II-4.6 II-4.7	pressure coefficient	coefficient de pression	ψ		pure number nombre pur	
	II-7.5	volumetric coefficient	coefficient volumétrique	φ		pure number nombre pur	
	II-1.5	outside diameter of the impeller	diamètre extérieur de la roue	D	L	m	mm
	II-1.5	hub diameter of the impeller	diamètre du moyeu de la roue	d	L	m	mm

1) See annex.

1) Voir annexe.

2) The roman numbers I and II refer to the relevant parts of this International Standard.

2) Les chiffres romains I et II se rapportent aux parties respectives de la présente Norme internationale.

3) M = mass L = length T = time Θ = temperature N = quantity of matter

3) M = masse L = longueur T = temps Θ = température N = quantité de matière

TABLE 2 – **Letters used as symbols**
TABLEAU 2 – **Lettres utilisées comme symboles**

Symbol **Symbole**	**Quantity**	**Grandeur**	**SI unit** **Unité SI**
A	area	aire d'une surface	m^2
c	velocity	vitesse	m/s
d	hub diameter of the impeller	diamètre du moyeu de la roue	m
D	outside diameter of the impeller	diamètre extérieur de la roue	m
e	relative clearance volume	espace mort relatif	pure number nombre pur
m	mass	masse	kg
Ma_{U}	tip Mach number	nombre de Mach de rotation	pure number nombre pur
n	exponent for polytropic process in $p.V$ diagram	exposant polytropique dans le diagramme $p.V$	pure number nombre pur
n	rotational frequency	fréquence de rotation	s^{-1}
p	pressure	pression	Pa
P	power	puissance	W
q_m	mass rate of flow	débit-masse	kg/s
q_v	volume rate of flow	débit-volume	m^3/s
R	molar gas constant	constante molaire du gaz	J/(K·mol)
t	time	temps	s
T	thermodynamic temperature	température thermodynamique	K
u	peripheral velocity	vitesse périphérique	m/s
v	mass specific volume	volume massique	m^3/kg
V	volume	volume	m^3
V_m	molar volume	volume molaire	m^3/mol
W	work	travail	J
W_m	mass specific energy	énergie massique	J/kg
W_v	volume specific energy	énergie volumique	J/m^3
Z	compressibility factor	facteur de compressibilité	pure number nombre pur
η	efficiency	rendement	pure number nombre pur
θ	Celsius temperature	température usuelle	°C
ρ	mass density	masse volumique	kg/m^3
φ	volumetric coefficient	coefficient volumétrique	pure number nombre pur
ψ	pressure coefficient	coefficient de pression	pure number nombre pur
ω	angular velocity	vitesse angulaire	rad/s

TABLE 3 – **Letters and figures used as subscripts**

TABLEAU 3 – **Lettres et chiffres utilisés comme indices**

Symbol Symbole	Meaning	Objet	Observations	
0	ambient condition	conditions ambiantes		
1	inlet	aspiration	indicates the quantities measured at the standard inlet point of the compressor	indique les grandeurs mesurées à la bride d'aspiration du compresseur
2	discharge	refoulement	indicates the quantities measured at the standard discharge point of the compressor	indique les grandeurs mesurées à la bride de refoulement du compresseur
a	absolute	absolue		
ab	absorbed	absorbée		
ar	shaft	à l'arbre		
b	atmospheric	atmosphérique	characterizes the atmospheric pressures and temperatures	caractérise les pressions et températures atmosphériques
C	contractual	contractuel	indicates the quantities specified in the contract	indique les grandeurs spécifiées au contrat
cd	condensate	condensat		
cr	critical	critique	characterizes the critical pressures and temperatures	caractérise les pressions et températures critiques
d	dynamic	dynamique	characterizes the dynamic pressures and temperatures	caractérise les pressions et températures dynamiques
e	effective	effectif		
g	overall	global		
i	indicated	indiqué		
in	internal	interne		
m	mass	massique	characterizes the mass specific rates of flow, energies and volumes	caractérise les débits, énergies et volumes massiques
m	molar	molaire	characterizes the molar volumes	caractérise les volumes molaires
me	mechanical	mécanique		
N	normal	normal		
pol	polytropic	polytropique	characterizes a polytropic process	caractérise une évolution polytropique
r	reduced	réduit	characterizes the reduced pressures and temperatures	caractérise les pressions et températures réduites
R	read	relevé	indicates the quantities read during the test or predetermined as test conditions	indique les grandeurs relevées en cours d'essai ou prédéterminées comme conditions d'essai
s	static	statique		
S	isentropic	isentropique	characterizes an isentropic process	caractérise une évolution isentropique
t	total	total		
T	isothermal	isotherme	characterizes an isothermal process	caractérise une évolution isotherme
th	theoretical	théorique		
u	useful	utile		
U	peripheral	périphérique		
v	volume	volumique	characterizes the volume rates of flow and energies	caractérise les débits et énergies volumiques

ANNEX

REFERENCES

ISO/R 31, Parts I, II, III and IV[1], and ISO 31/VIII.

ISO 3529, *Vacuum technology – Vocabulary.*[2]

ISO 3534, *Statistics – Vocabulary and symbols.*

ISO 4006, *Measurement of fluid flow-rate in closed conduits – Vocabulary and symbols.*[2]

Vocabulary of legal metrology, OIML.

ANNEXE

REFÉRENCES

ISO/R 31, Parties I, II, III et IV[1], et ISO 31/VIII.

ISO 3529, *Technique du vide – Vocabulaire.*[2]

ISO 3534, *Statistique – Vocabulaire et symboles.*

ISO 4006, *Mesure de débit des fluides dans les conduites fermées – Vocabulaire et symboles.*[2]

Vocabulaire de métrologie légale, OIML.

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[1] It should be noted that these first four parts of ISO/R 31 are currently being revised for publication as International Standards, and that consequently the reference numbers cited in the first column of table 1 are liable to amendment.

[2] At present at the stage of draft.

[1] Il est à noter que ces quatre premières parties de l'ISO/R 31 sont actuellement en cours de révision en vue de leur publication comme Normes internationales, et qu'en conséquence, les numéros de référence cités dans la première colonne du tableau 1 sont susceptibles de modification.

[2] Actuellement au stade de projet.

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